

Amendment and Response

Applicant: Dale C. Morris et al.

Serial No.: 09/499,720

Filed: February 8, 2000

Docket No.: 10991915-1 (H300.121.101)

Title: PRIVILEGE PROMOTION BASED ON CHECK OF PREVIOUS PRIVILEGE LEVEL

REMARKS

The following remarks are made in response to the Office Action mailed April 29, 2004. Claims 1-24 were rejected. No claims have been amended with this Response. Claims 1-24 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 102

The Examiner rejected claims 1-24 under 35 U.S.C. § 102(b) as being anticipated by Mahon et al., U.S. Patent No. 4,809,160.

Applicants submit that the Mahon et al. Patent does not teach or suggest the invention of independent claim 1.

The Mahon et al. Patent discloses a low overhead way for insuring that only routines of sufficient privilege can execute on a secured page of memory in a hierarchical computer system, and for raising the privilege level of a low privilege process in an orderly and secure way. This is done through the execution of a single "gateway" branch instruction standing between a procedure call by a lower privilege routine, such as a user program, and an operating system itself. (See Abstract). An instruction unit 20 contains a low privilege routine that requires a procedure call to a higher privileged service routine. The instruction unit 20 seeks this higher privileged routine by addressing a translation look aside buffer (TLB) 30 to determine the location in a physical memory 40 containing an appropriate entry point of a gateway instruction. The TLB 30 calculates the address of the desired entry point within the physical memory 40 and a gateway instruction located at the calculated address is then transmitted from the physical memory 40 to the instruction unit 20, to an execution unit 60, and to a physical target register 70. A return address for returning from the higher privileged service routine is then stored in the target register 70 by the instruction unit 20. The TLB 30 then checks the access rights of the calling instruction. If execute access is denied by the TLB 30, a software trap is transmitted from the TLB 30 to the instruction unit 20 to halt execution of the gateway instruction in the execution unit 60. If execute access is allowed by the TLB 30, and no delayed taken branch is pending, the gateway instruction saves the actual privilege level of the calling routine in target register 70, and raises the privilege level of the calling routine to the privilege level specified within the page type field

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412 of the TLB entry for the page containing the gateway instruction, and a target address for branching to a call routine is calculated. A target instruction located at the target address is then fetched from the physical memory 40 for use in the instruction unit 20 and execution of the called service routine having a desired higher privilege proceeds in the execution unit 60. After the finally called service routine is completed, the execution unit 60 reads the return address stored in the target register 70 and returns to the calling routine at the specified return address with the original lower privilege stored in the target register 70. (See column 3, line 16 – column 4, line 6).

Applicants submit that the Mahon et al. Patent does not teach or suggest the method of promoting a current privilege level of a processor of a computer system controlled by an operating system of claim 1. The Mahon et al. Patent fails to disclose **reading a stored previous privilege level state; comparing the read previous privilege level state to the current privilege level; and if the previous privilege level state is equal to or less privileged than the current privilege level, promoting the current privilege level to a second privilege level which is higher than the first privilege level**

In the Mahon et al. Patent, the gateway instruction does not read a stored previous privilege level state as suggested by the Examiner. The Examiner asserts that reading a stored previous privilege level state is equivalent to “read access rights of calling routine.” The read access rights of the calling routine of the Mahon et al. Patent are not stored as in the method of claim 1. The read access rights of the calling routine in the Mahon et al. Patent are stored by a gateway instruction, they are not read by a privilege promotion instruction.

In addition, the Examiner asserts that comparing the read previous privilege level state to the current privilege level, is equivalent to the “Compare,” “Access = OK?” of the Mahon et al. Patent. The compare in the Mahon et al. Patent is referring to the comparison of the read access rights of the calling routine and the read access rights of the page containing the gateway instruction; not to comparing the previous privilege level state to the current privilege level as recited in claim 1. The Mahon et al. Patent does not compare a previous privilege level state to a current privilege level.

Dependent claims 2-5 further define patentably distinct independent claim 1. Accordingly, dependent claims 2-5 are also believed to be allowable over the art of record.

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Applicants submit the Mahon et al. Patent also fails to teach or suggest the invention of independent claim 6. Applicants submit that the Mahon et al. Patent fails to disclose the method of executing instructions in a computer system controlled by an operating system of claim 6. The Mahon et al. Patent fails to disclose **performing a call instruction to a second page of memory not writeable by the application instructions at the first privilege level, the call instruction including: storing a return address to the first page of memory; and storing the first privilege level in a previous privilege level state.** In contrast, the gateway instruction in the Mahon et al. Patent, not the call instruction, stores the return address and access rights of the calling routine.

For the same reasons as discussed with reference to claim 1, the Mahon et al. Patent also fails to disclose **reading the stored previous privilege level state; comparing the read previous privilege level state to the current privilege level; and if the previous privilege level state is equal to or less privileged than the current privilege level, promoting the current privilege level to a second privilege level which is higher than the first privilege level.**

Dependent claims 7-11 further define patentably distinct independent claim 6. Accordingly, dependent claims 7-11 are also believed to be allowable over the art of record.

Applicants submit the Mahon et al. Patent also fails to teach or suggest the invention of independent claim 12. For the same reasons as discussed above with respect to claims 1 and 6, the Mahon et al. Patent fails to disclose the similar limitations of independent claim 12.

Dependent claims 13-16 further define patentably distinct independent claim 12. Accordingly, dependent claims 13-16 are also believed to be allowable over the art of record.

Applicants submit the Mahon et al. Patent also fails to disclose the invention of independent claim 17. For the same reasons as discussed above with respect to claims 1 and 6, the Mahon et al. Patent fails to disclose the similar limitations of independent claim 17.

Dependent claims 18-22 further define patentably distinct independent claim 17. Accordingly, dependent claims 18-22 are also believed to be allowable over the art of record.

Applicants submit the Mahon et al. Patent also fails to teach or suggest the invention of independent claim 23. For the same reasons as discussed above with respect to claim 1, the Mahon et al. Patent fails to disclose the similar limitations of independent claim 23.

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Dependent claim 24 further defines patentably distinct independent claim 23.

Accordingly, dependent claim 24 is also believed to be allowable over the art of record.

In view of the above, Applicants respectfully request that the 35 U.S.C. § 102 rejections to claims 1-24 be removed and that claims 1-24 be allowed.

CONCLUSION

In view of the above, Applicants respectfully submit that pending claims 1-24 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-24 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(b)(c). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 08-2025.

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The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to either David A. Plettner at Telephone No. (408) 447-3013, Facsimile No. (408) 447-0854 or Patrick G. Billig at Telephone No. (612) 573-2003, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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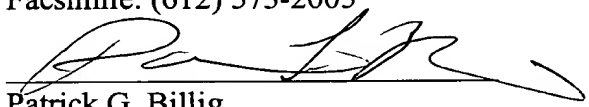
Respectfully submitted,

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CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 29 day of July, 2004.

By 
Name: Patrick G. Billig